

Project # 117

Diagnostics Capital Equipments Injector and Storage Ring

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*A U.S. Department of Energy
Office of Science Laboratory
Operated by The University of Chicago*



- Objectives: To purchase critical diagnostic equipments –
 - 1) Dynamic Signal Analyzer
 - 2) Fast Oscilloscope
 - 3) Digital Sampling Oscilloscope with Time Domain Reflectometer
 - 4) Intensified Gated Camera

- Background Information:
 - 1) One year project; High priority
 - 2) No capital equipment funds approved in fy04

- Benefit to APS: Maintain critical diagnostics capabilities -
 - 1) Enhance real time orbit feedback system performance;
 - 2) Maintain high level of diagnostics system's measurement capabilities;
 - 3) Continue to provide high level of diagnostic's calibration capabilities;
 - 4) Ensure availability of state-of-the-art equipment set up to study machine parameters.

- Cost:
 - 1) Fy05 cost = \$185K
 - 2) Cost to complete project = \$185K (No effort cost)

Justification:

Dynamic signal analyzer –

- Frequency Spectrum and Phase response measurement capabilities are needed to analyze and maintain narrowband BPMs – total of 80 BPMs
- These measurements are crucial to maintain and/or enhance the orbit feedback system performance, in particular for the real time feedback system.
- Presently, Diagnostic borrows signal analyzer from other group, but its increase demand in diagnostics group requires signal analyzer available full time.

Fast Oscilloscope –

- Maintain capability to investigate s-band rf signals which need to be monitored and analyzed. It is crucial for many diagnostics hardware such as beam position monitors, fast current monitors and rf to beam phase detectors.
- Diagnostics has one such fast oscilloscope, and requesting for 2nd unit due to increase demand and as a back up in case 1st unit fails.

Justification - continued

Digital sampling scope with time-domain reflectometer (TDR) –

- Provides a way to evaluate impedance values and variations along a transmission line such as cables, connectors or a micro-strip on a PC Board
- Diagnostics uses TDR extensively to phase match critical cables for BPMs
- Existing unit is getting obsolete and have become expensive to maintain.

Gated camera -

- Provide capability to study kicker induced motion, the injection process, top-up operation and instabilities at high bunch current level.
- The short time gate is a good match to the sr bucket spacing and bunch length for isolating individual bunches/ events for reducing undesired image background.

Date: Mon, 16 Aug 2004 15:05:36 -0500
From: Robert M Lill <blill@aps.anl.gov>
Subject: Time Domain Reflectometer (TDR)
To: "Om V. Singh" <singh@aps.anl.gov>
Cc: Charles Gold <gold@aps.anl.gov>

Om,

The TDR has failed self-test and there is *great concern of whether it can be economically repaired*. This is the equipment we planned to replace during the *last few years of capital equipment proposals*. We are investigating the repair situation presently and will keep you posted. *This equipment will be needed during the shut down to test cables.*

Bob